THE

Malayan Agricultural Journal.

OCTOBER, 1935.

EDITORIAL.

The Malayan Rubber Industry.

From the proprietor's and shareholder's point of view, probably the most important feature in the Malayan rubber industry in 1934 was the partial recovery of the price of the commodity which resulted from the introduction of the International Scheme of Rubber Regulation. But more important than the early distribution of dividends is the fact that the recovery has placed in producers' hands funds to effect improvements on estates which may result in lowering future costs of production.

In this number we publish a review of the industry in 1934 written by the Adviser on Agriculture, and also draw attention to the annual report of the Director of the Rubber Research Institute of Malaya, to the revised statistical publication on the Malayan rubber industry, and to a small-holders' advisory service which has recently been inaugurated. A study of these publications should convince the reader that the planter, his technical advisers, and the manufacturers of machinery for the preparation or rubber, have made good use of better market conditions by the improving of the areas planted with this crop which will, in the future, tend towards increasing the yield per acre and consequently reducing production costs.

During the period immediately preceding the introduction of rubber regulation, costs of production were perforce reduced by drastic cuts in wages and upkeep of estates. The effect was to lower efficiency and to jeopardize the future productivity of these areas. Such cuts were essential to meet the crisis but their continuance over an extended period might have proved a disaster of first magnitude. Fortunately, the increased funds made available by the improved market have been used in many cases to put in hand the postponed cultural and other routine work on estates, and in the introduction of improvements. Increased attention is given to manuring and re-planting, and to the introduction of improved machinery for the preparation of rubber. We believe that such developments as these and the large areas of budded trees and of trees obtained from seed of proved clones will greatly influence future costs of production. Whereas during the slump, costs were reduced by means which were detrimental to the value of the property, in the

future, economies of production will be effected as a result of the application of more scientific methods of production. Rubber-producing companies who pursue an enlightened policy of development on their estates may face the future with more confidence, even if the level of prices for the next decade or so should prove to be on a lower level than producers hope will be the case.

Malayan Pineapple Canning.

Articles published in recent numbers of this Journal have included three, written by Dr. H. A. Tempany, C.B.E., dealing with the trade in canned fruits in the United Kingdom, the canning of fruit in the United Kingdom, and the control and organization of fruit canning in the United Kingdom. The very close consideration which is given to every aspect of fruit canning in the United Kingdom and the very striking growth of the industry which has there been so carefully fostered by the Government, renders it a model upon which we in Malaya may re-organize the pineapple-canning industry. It does not follow, of course, that methods used in the United Kingdom are necessarily applicable to local conditions, but it behoves those who are interested in the Malayan industry—not only the Governments concerned, but the growers, packers, and exporters—to acquaint themselves with conditions obtaining elsewhere, and to consider how far such methods may be usefully applied in Malaya. A book on the pineapple, reviewed in this number, is valuable in this connexion, and an article by Mr. G. D. P. Olds places the reader in possession of the Malayan policy.

The policy is based on the recommendations of the Pineapple Conference which sat in Singapore in 1931. The development of the policy has moved slowly from that time, but we believe it has not suffered thereby. Agreement between Governments concerned regarding each step has been achieved, in addition to which the trade has been taken into the confidence of the Government. The adoption of each recommendation has received the general support of those intimately interested in the industry and will, therefore, we believe, prove a success.

The Derris Root Industry.

Various technical aspects of the derris root industry have been studied by the Department, and a number of valuable contributions to knowledge of this crop published in the past two or three years. Public interest in derris cultivation is very considerable and officers of the Department are frequently receiving enquiries on the subject from prospective cultivators and buyers.

For this reason we publish on another page a general account of the cultivation of this insecticide. This account forms one chapter of a forthcoming publication of the Department, entitled: "An Outline of Malayan Agriculture." The publication of this chapter will, we believe, prove acceptable to many of our readers who desire information on this subject.

Original Articles.

MALAYAN RUBBER INDUSTRY IN 1934

BY

H. A. TEMPANY,

Director of Agriculture, S.S., and Adviser on Agriculture, Malay States.

Prices.

During the first half of January the Singapore spot price of rubber smoked sheet equal to London Standard was around 13⅝ cents per lb., the lowest price quoted during the year being 13⅜ cents on 4th January. Thereafter the price appreciated rapidly to about 16¼ cents per lb. With minor fluctuations it remained at around this price until the middle of March when higher prices ruled with wider fluctuations, caused by the expectation of the early introduction of a measure of restriction of production or exports. Reports of an international agreement for restriction of rubber production, and their confirmation on the 30th April caused a further sharp rise in prices, culminating on 8th May in 24¾ cents. The price then fell rapidly until at the end of that month it was about 19 cents per lb. The price rose steadily throughout June, July, August and September, reaching the highest quotation for the year on 6th September, when it stood at 25⅝ cents per lb. Thereafter, until the end of the year the price weakened, the market closing in December at 20¾ cents per lb.

The average price of rubber in Singapore during the year was 20.63 cents per lb., in London 6.17d. per lb. and New York 12.80 cents gold per lb., as compared with 10.21 cents, 3.21d. and 5.83 cents gold respectively in 1933.

Areas.

A complete revision of the statistics of areas planted with rubber has been undertaken but at the time of writing is still incomplete in respect of small holdings. The revised statistics are given in Table I.

According to returns submitted by Land Officers the following new areas of rubber were planted during the year.

TABLE 2.

New Areas of Rubber Planted during 1934.

	On Estates of over 100 acres.	On Estates of less than 100 acres.
	Acres	Acres
Straits Settlements ...	30	89
Federated Malay States ...	9,000	6,674
Total ...	9,030	6,763

Table 1.

Area under Rubber in Malaya 1934.

State or Territory	Estates of 100 acres and over			Estates* under 100 acres Total acres	Total Planted area in 1934 acres
	Mature area acres	Immature area acres	Total area acres		
Perak ...	256,176	41,978	298,154	254,886	553,040
Selangor ...	307,652	54,848	362,500	157,850	520,350
N. Sembilan ...	221,963	59,713	281,676	82,707	364,383
Pahang ...	45,873	44,467	90,340	76,902	167,242
Total F.M.S. ...	831,664	201,006	1,032,670	572,345	1,605,015
Malacca ...	115,856	10,063	125,919	74,985	200,904
P. Wellesley ...	42,987	2,207	45,194	19,843	65,037
Dindings ...	6,785	6,159	12,944	7,667	20,611
Penang ...	2,207	732	2,939	16,600	19,539
Singapore ...	32,994	471	33,465	20,004	53,469
Labuan ...	—	—	—	2,010	2,010
Total S.S. ...	200,829	19,632	220,461	141,109	361,570
Johore ...	341,715	166,053	507,768	392,589	900,357
Kedah ...	174,829	29,793	204,622	100,691	305,313
Perlis ...	1,206	363	1,569	4,802	6,371
Kelantan ...	22,704	10,468	33,182	42,408	75,590
Trengganu ...	4,643	5,357	10,000	20,000	30,000
Brunei ...	4,991	3,116	8,107	11,500	19,607
Total U.M.S. ...	550,098	215,150	765,248	571,990	1,337,238
TOTAL MALAYA ...	1,582,591	435,788	2,018,379	1,285,444	3,303,823

*Figures for estates under 100 acres in the Federated Malay States and Straits Settlements are the 1933 areas plus new plantings in 1934 as advised by District and Land Officers.

Production, Exports and Stocks.

The production of rubber in Malaya during the year amounted to 479,371 tons, as compared with 459,836 tons in 1933. The distribution of production is shewn in Table 3.*

TABLE 3.
Malayan Production of Rubber in 1934.

	Production by Estates of 100 acres and over.	Production by Estates of less than 100 acres.	Total Production
	Tons	Tons	Tons
Straits Settlements ...	147,417	141,141	251,558
Federated Malay States ...	28,280	31,403	59,683
Unfederated Malay States ...	86,671	81,459	168,130
Total ...	262,368	217,003	479,371

The corresponding figures for 1933 were 240,104 tons produced by estates of 100 acres and over, and 220,639 tons produced by estates of under 100 acres.

The foreign exports from Malaya during the year were 677,208 dry tons, while domestic exports were estimated to be 465,765 dry tons.

Latex Export.

The exports of rubber in concentrated forms of latex shewed a considerable increase over previous years. Latex with a dry rubber content of under 4.8 lbs. per gallon was exported to the extent of 5,445 tons dry rubber equivalent; 4.8 to 5.7 lbs. per gallon, 6,002 tons; over 5.7 lbs. per gallon, 2,725 tons—giving a total export dry rubber equivalent of 14,172 tons, valued at $7,119,548 as compared with 10,470 tons in 1933, 5,192 tons in 1932 and 1,925 tons in 1931.

Stocks, Local Consumption, and Exports.

Stocks in Malaya at the end of 1934 amounted to 91,009 tons of which 10,887 tons were at ports, 67,622 tons in the hands of dealers and 12,500 tons held by estates of 100 acres and over. Stocks held on small holdings are considered to be negligible.

Local consumption of rubber, used for the manufacture of rubber goods of various descriptions, amounted to 872 tons as compared with 2,878 tons in 1933.

The net exports of rubber (in tons) from Malaya, the Netherlands Indies, and Ceylon for the past five years were as follows:—

* Abstracted from Malayan Rubber Statistics for December, 1934, published by the Registrar—General of Statistics, Straits Settlements and Federated Malay States, at Singapore on 24th January, 1935.

Table 4.

Net Exports of Rubber.

(including dry weight equivalent of latex).

Year	Malaya*	Netherlands Indies†	Ceylon†
	Tons	Tons	Tons
1929	418,000	285,000	80,300
1930	420,985	241,000	75,600
1931	393,603	257.000	62,300
1932	385,961	211,000	49,300
1933	405,297	280,800	63,800
1934	465,765	378,125	79,056

* As quoted in Malayan Foreign Imports and Exports annually.

† As quoted in the "Statistical Bulletin of the International Rubber Regulation Committee", February, 1935.

Net world exports in 1934 are stated to have been 1,027,572 tons, world absorption 952,881 tons, and stocks at the end of December 352,632 tons in the United States of America and 134,927 tons in the United Kingdom (London and Liverpool).

Rubber Areas out of Tapping.

The higher price which prevailed for the commodity during the year had the effect of causing the resumption of tapping over large areas upon which it had previously ceased. The following table is a comparison of the area out of tapping in Malaya at the end of December 1933 and December 1934.

Table 5.

Malaya—Acreage out of tapping on estates of 100 acres and over.

Date.	Estates which have entirely ceased tapping.		Estates which have ceased tapping part of area.		Total acreage out of tapping.	Percentage of tappable rubber out of tapping.
	Acreage out of tapping.	Percentage of tappable rubber out of tapping to tappable rubber.	Acreage out of tapping.	Percentage of tappable rubber out of tapping.		
December 1932	141,448	9.9	173,377	12.2	314,825	22.1
„ 1933	72,483	4.9	176,017	11.8	248,500	16.7
„ 1934	33,613	2.1	191,552	12.2	225,165	14.3

Conditions on Estates.

With the improvement in the price of rubber, estates were once more able to make a profit on working. Part of the profits were in many instances used for restoring some portion of previous cuts of salaries and wages and for undertaking such forms of maintenance work as had perforce to be discontinued during a period of low prices.

During the early part of the year, owing to the price of the raw product, little interest was taken in measures for the improvement of soil fertility other than the development and control of natural covers, but on the introduction of legislative control of export, renewed interest was manifested in the application of artificial fertilizers and in replanting problems.

Application of nitrogen in the form of ammonium sulphate and of complete fertilizers has been adopted on a number of estates on which yields were tending to decrease.

There is some tendency to assume that general recommendations in relation to manuring suitable to all cases can be made, but in practice each case requires to be considered on its merits.

In some cases the manuring of the present stand of trees may be advisable, while in others replanting with high-yielding material may be the most economical procedure.

When replanting is effected, the application of a complete fertilizer is usually indicated except on the coastal clay soils.

Interest has been maintained in the improvement and regeneration of soils by the controlled use of natural undergrowth, although planters are beginning to realize that the effecting of improvement by this means may be a slow process especially when soil deterioration has reached an advanced stage.

Considerable interest has been maintained in systems of tapping. Experience has shown that the double-four system, *i.e.* two cuts at different levels on opposite sides of the tree tapped every fourth day, appears to maintain yields at a level equal to those given by a single cut tapped alternate daily, with about a 20 per cent. reduction in tapping costs. Many estates are also adopting periodic systems of tapping such as the A.B.C. or A.B.C.D. The adoption of these systems has been accelerated by the regulation of exports.

The "Sunderland" system of double cuts tapped every third day with equal tapping and resting periods has not so far proved very satisfactory under Malayan conditions.

Budgrafting and Seed Selection.

Owing to the fact that ample supplies of material are now available in Malaya, the importation of budwood and selected seed was negligible, and with the introduction of legislation for the control of exports such importations are now prohibited.

Interest in budgrafting and seed selection has been maintained, with special reference to the replanting of permitted areas under rubber regulation.

During the year one area of over 50 acres of monoclone planting yielded nearly 600 lbs. of rubber per acre at the age of 5 to 6 years. Results for shorter periods on monoclone areas of other buddings are of a similar order.

A list of "proved" clones which are assessed as budded rubber for yield allowances has been published by the Controller of Rubber.

The following table shews the areas under budded rubber in Malaya as at the end of 1933 and 1934. The considerable increase in the 1934 figures is due to the revision of rubber statistics already mentioned.

TABLE 6.

Areas of Rubber Budgrafted in Malaya.

	1933		1934	
	No. of Areas	Total Acreage	No of Areas	Total Acreage
Federated Malay States ...	338	89,162	354	103,362
Straits Settlements ...	44	4,572	49	7,769
Unfederated Malay States ...	121	70,825	174	93,560

Factory Procedure and Preparation of Rubber.

As a general rule estates which are installing new machinery adopt the line-ahead sheeting batteries; these have generally proved quite satisfactory after experience has been gained in adjustment.

In the preparation of smoked sheet, economy in fuel and in time of smoking is being effected by the erection of more modern types of smoke houses. The "Subur" smoke house, which is a one-story building of separate compartments, with racks on trolleys and an underground flue, has proved very successful on a number of estates and is recommended by the Rubber Research Institute. Hot-air dried sheet is now being prepared on one or two estates for special consumers.

One large company continued to export nearly all of its crop in the form of concentrated latex and a few other estates prepared and exported creamed concentrated latex and ordinary field latex. Revertex (evaporated concentrated latex) was prepared on and exported from two estates in Johore. Numerous complaints were received in regard to the discolouration of latex and an investigation carried out by the Rubber Research Institute shewed that this discolouration was due to contamination of the latex with iron, accelerated by incipient fermentation of latex before ammoniation. A number of "dopes" for treating the interior of iron containers have been examined with a view to preventing this discolouration, but no really satisfactory product has yet been

discovered, although one or two appear promising. Considerable interest has been taken in crumb or powdered rubber, although this product is not yet prepared commercially on estates in Malaya.

Much work was performed in regard to new uses and application of rubber and latex; in this connexion the Rubber Research Institute, Malaya, collaborated with the London Advisory Committee (Ceylon and Malaya), with the Technical Research and Development of New Uses Committee of the Rubber Growers' Association and with manufacturers.

About 50 per cent. of the present consumption of latex is applied to new uses and accordingly represents an increase in consumption.

Investigations are being carried out at the Rubber Research Institute in relation to the properties of latex and rubber from different clones and these will be extended as latex and rubber from additional clones become available.

Conditions on Small-Holdings.

It was estimated that the total area of rubber untapped on small holdings in December was 41,000 acres in the Federated Malay States and 11,600 acres in the Straits Settlements, as compared with 45,000 acres and 14,000 acres respectively at the end of 1933.

With the introduction of rubber regulation, scrap rubber became almost unsaleable in many districts, the issue of coupons in most cases being sufficient to cover only the production of sheet. Small dealers preferred to purchase wet rubber as, being covered by coupons, it enabled them to accumulate coupons in excess of the dry rubber held by them. The activities of officers of the Department of Agriculture, the Rubber Research Institute of Malaya and the Co-operative Department in pointing out this loss to small cultivators, resulted in an improvement in the condition of rubber offered for sale by them.

There was considerable variation in the grades of rubber purchased by dealers, thus apparently indicating that there is no definite preference for either smoked or unsmoked sheet.

The number of small holdings left untapped decreased during the year, but the percentages of these fluctuated from time to time according to the supply of export coupons available, and was further influenced, in the neighbourhood of rice land, by the incidence of work in the padi fields. Conditions on holdings improved to some extent and the decrease in production under regulation led to increased activity in cleaning and weeding owing to the fear that export rights would not be allowed in respect of holdings that were heavily covered with undergrowth.

During the year the Rubber Research Institute of Malaya commenced the recruitment of a staff of Asiatic Instructors for work on small holdings throughout the country in accordance with the recommendation of the Commission of Enquiry into the affairs of the Institute. These instructors obtain their instruction and advice from the Institute, but for the purpose of supervision are placed under the control of Agricultural Officers of the Field Branch of the Depart-

ment of Agriculture in the various States. The instructors give lectures and demonstration on all aspects of rubber production, paying special attention to tapping, control of disease, renewing bark and preparation of good quality sheet. This last is of special importance to small-holders under the regulation scheme since for purposes of export right all rubber is considered to be dry; in consequence, a high moisture content in the sheet rubber represents a dead loss to small-holders in respect of export right.

Some improvement in the quality of sheet produced in the small holdings has already resulted from the work of these instructors. There is also a perceptible improvement in general condition in relation to upkeep on small holdings, while there is increasing apprehension of the necessity for adequate measures for disease control.

In the latter connexion the scheme inaugurated in 1933 for the distribution to small-holders of approved fungicides for the treatment of Mouldy Rot has now become established throughout the greater part of the Peninsula.

Some attention was given during the year to the question of coagulants employed by small-holders and a survey was made of the various types used. It was found that in many cases unsuitable coagulants were being used, including sulphuric acid, while the prices that were being charged to small-holders for coagulants were often unduly high. As the result of this enquiry it has been possible to improve the situation considerably and in many districts small-holders are now able to obtain formic or acetic acid at prices which are in accordance with current market values.

Pests and Diseases of Rubber.

The prevalence of Mouldy Rot disease on bark varied as usual with the weather conditions. Leaf mildew due to *Oidium Heveae* occurred fairly generally in Selangor, Negri Sembilan, parts of Perak, Province Wellesley, Malacca, Johore, and South Kedah. Sulphur dusting with a view to controlling this disease was undertaken on several estates, more especially in Negri Sembilan and Malacca.

Recent investigations revealed that in certain localities root diseases of rubber are doing more damage on small holdings than was formerly supposed. Control of these diseases on small holdings presents special difficulties and the question requires further attention.

Acknowledgment.

Acknowledgment is made of the assistance rendered by the Rubber Research Institute, Malaya, in the preparation of this report.

THE MALAYAN PINEAPPLE CANNING INDUSTRY

BY

G. D. P. Olds,

Agricultural Field Officer, Singapore.

Reference has constantly been made, both in Departmental publications and in the Press, during the past few years, to matters affecting the Malayan pineapple industry, and increasing attention has been paid to these subjects by all sections of the industry as well as by the Malayan, the United Kingdom and other Governments. It is felt, therefore, that the time has now arrived when a useful purpose will be served by describing the progress of this industry and summarizing the measures which have been, and are being, taken for its improvement. It may be recalled that in December 1930 and March 1931, a series of meetings of a Conference appointed by H.E. the Governor to investigate the conditions then obtaining in the industry, was held in Singapore. The results of these meetings were published in the form of a report in August 1931. The report of this Conference outlined the history, development and status of the Malayan pineapple industry and contained a number of recommendations. Since that time, action has been taken by the Department of Agriculture, S.S. and F.M.S., to put into operation some of the recommendations of the report and it will, therefore, be of interest to examine the nature of these steps and to review the progress made.

Pineapples as a Main Crop.

Considerable stress was laid in the Report on the fact that pineapples were primarily grown as a catch crop with rubber, and that methods of cultivation and yields were considered secondary matters by growers, the main purpose of the crop being to produce a certain amount of revenue until the rubber matured. The influence of this attitude on the nature of the industry as a whole was emphasized, and it was therefore recommended that research should be carried out on the economic possibilities of growing pineapples as a sole crop, and that the development of large scale pineapple plantations should be encouraged. It was further pointed out that with the curtailment of rubber planting, there was a distinct possibility of a reduction in the output of pineapples and that, therefore, it was very desirable that action should be taken to encourage planting of pineapples in order to obviate a possible future shortage of supplies.

Establishment of the Pineapple Experiment Station, Singapore.

Effect has been given to the above recommendations and satisfactory results have been obtained. An area of some 33 acres was opened in 1931, at Lim Chu Kang in Singapore, for the investigation of major problems in connexion with the growing of pineapples as a sole crop. From this area,

which is known as the Pineapple Experiment Station, Singapore, some results of considerable value have already been obtained and the information therefrom has been disseminated amongst growers. Probably the most important of these results are those which have been obtained from manurial experiments, but other experiments dealing with cultural treatments, green manures, planting distances, varieties of pineapples and artificial selection, are still in progress, and are expected to yield results of importance in the near future.

Pineapple Plantations.

In addition to the acquisition of much useful knowledge of the requirements of pineapples planted as a sole crop, derived from the above source, the policy of land alienation for pineapple planting, particularly in the State of Johore, has brought about a radical change in the conditions under which pineapples are planted. Instead of being regarded purely as a catch crop with rubber, pineapples have now become a main crop and very extensive areas of virgin and secondary jungle land in Johore, and to a smaller extent in Singapore, have been cleared and planted with this crop. Some idea of the progress of such planting may be obtained from the fact that whereas in 1931 no areas were planted with pineapples as a sole crop, by the end of 1933 there were 10,000 acres in Johore and 2,000 acres in Singapore so planted. Some of the properties in Johore, which are in the region of 3,000 to 4,000 acres in extent, are very impressive, and indicate the rapidly-changing attitude towards the cultivation of this crop.

Cultivation Methods.

It is, however, desirable to point out that many of the problems connected with sole-crop pineapples in Malaya are as yet unsolved and if the industry is to achieve stability, closer attention to these problems must be paid. One of the most striking of these problems is that of soil erosion, which, on undulating land, is already showing signs of having a serious effect on the yield and life of the plant; the question of soil impoverishment due to continuous cropping also needs immediate attention. Investigations along these lines are in progress at the Pineapple Experiment Station, while arrangements are also being made to lay down experiments in Johore.

Harvesting and Transport of Fruit.

It has also been pointed out from time to time that two of the chief factors influencing the poor prices realized by growers for their fruit are the methods of harvesting and transport. Until quite recently it has not been possible for the canner to exercise any control over the harvesting of the fruit with the result that it is received at the factory in all stages of ripeness and of very varying sizes. Furthermore, the transport to the factory is normally carried out by middlemen, who have little or no interest in the quality, size or ripeness of the fruit. Efforts to change this state of affairs are being made.

The large areas now planted as a sole crop in Johore are, in several cases, owned or part-owned by the canner and it is therefore possible for him to control the harvesting to a large extent.

Furthermore, land for pineapple planting in Johore is now only alienated on special conditions designed to ensure the prevention of soil erosion and the maintenance of fertility. The Department of Agriculture is also considering the possibility of preparing crop forecasts for the benefit of the industry. Such forecasts would be undoubtedly helpful inasmuch as the canner would be enabled to estimate his probable output and could then fix his prices for fresh fruits at the beginning of the season.

From the above it will be apparent that considerable changes have occurred in the planting side of the industry and that further improvements may be anticipated in the near future.

Conditions in Pineapple Factories.

It is well known that the appearance, design, lay-out, and methods of canning of Malayan pineapple factories have, in the past, left much to be desired. Lack of capital on the part of factory owners has been chiefly responsible for the primitive factory methods and factory hygiene. The unsatisfactory nature of factory conditions has been emphasized very strongly by the Department of Agriculture for some considerable time and concrete measures to improve these conditions have recently been introduced by Government. A bill entitled the Pineapple Industry Ordinance in the Straits Settlements with corresponding Enactments in the States of Selangor and Johore was brought into force on October 1st, 1934. This bill has two main provisions,—one of which concerns factory conditions. Contrary to previous practice, the owners of all pineapple canneries must apply to have their factories registered, and such registration is only granted if the conditions in the factory comply with the regulations laid down by Public Health authorities. By the operation of this Ordinance and the corresponding Enactments, it is possible to ensure that all pineapple factories in Malaya are suitable, from the hygienic point of view, for producing pineapples canned under satisfactory conditions. The Public Health Authorities of the three Administrations concerned have conferred together and agreed upon a schedule of minimum requirements necessary before a factory can be registered. The other provisions of the Ordinance affect other aspects of the canning side of the industry and will be referred to later. A very considerable improvement in the conditions obtaining in Malayan pineapple factories has already been effected and further improvements are anticipated.

Grading and Inspection.

One of the most important recommendations of the Pineapple Conference dealt with the question of the production of standard grades of canned pineapples, it being strongly advocated that a Government grading and

inspection scheme should be introduced. As might be anticipated, efforts to inaugurate any such scheme were at first strongly opposed, and led to much discussion amongst the various sections of the industry. During the past three years, however, the attitude of the industry towards the establishment of standard grades has decidedly changed and considerable progress towards that end has been made. The Pineapple Industry Ordinance makes provision for the introduction of regulations regarding a number of points connected with the industry and one of these is concerned with the establishment of standard grades of canned pineapples and the provision of a grading and inspection service. At an informal meeting held in Singapore on July 6th 1934, attended by accredited representatives of the growers, canners and exporters and presided over by the Adviser on Agriculture, the methods whereby a grading and inspection service scheme could be most effectively introduced were discussed. As a result of this discussion it was decided that a memorandum outlining the proposals in this respect should be drawn up by the Adviser and submitted to a meeting of all members of the industry for their opinions. The scheme proposed is one which follows very closely the lines of the "National Mark" system in the United Kingdom. It is entirly a voluntary system of grading, inasmuch as canners would be invited to co-operate by producing fruit which has been graded in accordance with Government standards. These standards have been drawn up and have received the provisional approval of the industry. Under the proposed scheme, any owner of a registered factory or factories who wishes to produce graded pineapples would apply to the requisite authority to have his factory placed on a "grading white list". The lay-out and equipment of his factory would then be examined and if considered suitable for the production of graded pineapples, the factory would then be placed on the grading white list. The canner could then proceed to produce graded pineapples and would be permitted to affix to each tin a stamp stating that the goods are graded in accordance with Government standards. It is important to note that there is nothing to prevent a canner who is placed on the white list producing pineapples not so graded, provided he does not affix the grading stamp. The grading would be entirely voluntary on his part and the proportion of graded to ungraded produce would be entirely in his hands. The factory and its equipment would be liable to surprise inspections by an inspector appointed under the Pineapple Industry Ordinance and any attempt at false representation of ungraded produce on the part of the canner would cause his factory to be removed from the grading white list.

The above in broad outline, gives the main principles of the proposed scheme for inspection and grading. It will be seen that all the onus of producing graded pineapples is placed on the canner and that the scheme does not involve the employment of a large number of inspectors, or the inspection of every consignment. It is easily within the capabilities of one Inspector to pay surprise visits to all the factories and to ensure adherance to the require-

ments of the scheme. It is important to note that pineapple importers in the United Kindom and in Canada have for a long time been desirous of obtaining standardized Malayan pineapples, and it is therefore anticipated that the demand for graded produce will grow to such an extent that inferior produce will be largely displaced from United Kingdom and Canadian markets. In this connexion it may be recalled that a report on a consignment of pineapple graded in accordance with Government standards and despatched to the United Kingdom, was published in this Journal in August 1934 and showed that the demand for graded pineapples would be represented by a definitely enhanced price. The fact that the principles of the grading and inspection service outlined above have been informally agreed to by accredited representatives of the pineapple industry indicates that considerable progress towards the establishment of the Malayan pineapple industry on a firm basis has been achieved since the investigation made by the Pineapple Conference.

Marking of Tins.

Mention has been made above of one of the two main provisions of the Pineapple Industry Ordinance which is now in force. The second of these provisions is also of very considerable importance. The Ordinance requires that all tins of pineapples from a factory shall have embossed or indelibly stamped thereon a mark, which is registered by the Registering Authority, and which is the official registered mark of the factory in which they are produced. The value of this provision lies in the fact that it is possible to trace the origin of any particular tin to the factory itself, a matter of importance in the event of claims for poor quality consignments. The mark is in no sense a trade mark, since it conveys nothing to the consumer and is of importance chiefly to the wholesale buyer of the pineapples. By this means, if certain factories are found regularly to produce better goods than others, the buyer is able to exercise discrimination in his orders for Malayan pineapples, thereby stimulating competition amongst factories. Further, in the event of serious complaints as to the condition of the contents of any cans, the factory of origin can be traced with certainty.

In conjunction with the grading and inspection scheme, the cost of which would be defrayed by a small cess on the exports of canned pineapples, a proposal has also been put forward that any balance of the revenue yielded from the export cess should be devoted to propaganda. It has been pointed out from time to time that much of the popularity enjoyed by Malayan pineapples has been the direct result of the publicity given to them by the Malayan Information Agency and the Empire Marketing Board, and by some of the larger importing firms in the United Kingdom. The cost of the publicity campaigns organized by the Malayan Information Agency and the Empire Marketing Board has been borne in the past by Government, but it is reasonable to take the view that the cost of any increased propaganda is a legitimate charge on the industry itself and should therefore be borne by it.

Summary.

The above article reviews the progress following the recommendations of the Pineapple Conference of 1931. Attention is drawn to the results of establishing an Experiment Station for carrying out investigations as to the requirements of pineapples grown as a sole crop. Reference is also made to the increased acreage of land planted in sole crop pineapples, to the large-scale plantations established in Johore, and to the efforts made to effect an improvement in harvesting and transport methods.

A review is also made of the main provisions of the Pineapple Industry Ordinance and to the proposals for putting into operation a grading and inspection scheme organized on lines similar to those of the National Mark system in the United Kingdom. It is pointed out that standard grades for canned pineapples exported from British Malaya have been drawn up, and agreed to by all sections of the industry, and reference is also made to the necessity for providing, by means of a small cess on exports, funds to cover the cost of an inspection service and of increased propaganda.

Conclusions.

In an industry which has been established as long as the pineapple industry and which has grown up from an extremely small beginning to an industry whose value is of considerable importance to British Malaya, it is natural that many old-established practices and beliefs have grown up with it, and that efforts made to improve conditions are regarded with a conservative eye. Sudden radical changes in an industry are hardly ever desirable or practicable and it is necessary to proceed cautiously in establishing any new practices. It has been shown above that the progress along certain lines of improvement during the past four years has been very encouraging and that ideas are slowly changing on many of the subjects relating to the industry. This steady advance towards modernization is very satisfactory and there can be no doubt that if it is continued, Malaya will in due course possess an industry which is an extremely valuable asset, and which is stabilized on a sound basis.

DERRIS (TUBA ROOT)*

Compiled by
D. H. Grist,
Agricultural Economist.

The Malay word "tuba" is applied to a number of poisonous plants, amongst which various species of derris are the most important. The toxic qualities of derris have long been recognized by the Malays who use an extract of it for fishing purposes, and by the Chinese who employ it as an insecticide.

Botanical.

Two species of derris are commonly cultivated in the Malay Peninsula, *Derris elliptica,* Benth. (tuba puteh) and *Derris malaccensis,* Prain. (tuba merah). The former is a widely-spread plant, found from Chittagong through Siam, Cambodia and Malaya to New Guinea and the Bismarck Archipelago. It is doubtful whether it is ever found truly wild in the Malay Peninsula.

Derris malaccensis is indigenous to Malaya. Most, if not all of the local stock of *D. malaccensis* originated in Sarawak, hence its varietal names—*sarawakensis* and "Sarawak erect".

Derris malaccensis var. *sarawakensis* is an erect shrub-like plant, the stems not trailing on the ground, or forming a cover. It is widely known under the names "tuba rabut" and "Sarawak erect".

Derris elliptica, "Sarawak creeping", an introduction from Sarawak, has a prostrate habit, forming a close cover, with the stems often rooting profusely between nodes.

Other varieties of *Derris elliptica* have been described and are of importance in view of the fact that the toxic content of the varieties varies considerably. Intending planters are advised, therefore, to give very close consideration to this point before embarking on the cultivation of this crop, in order to make sure that the stock is the best obtainable.

Cultivation.

Derris is propagated readily by means of stem cuttings. The cuttings are mature wood and about 18 inches in length. They are planted thickly in nursery beds and kept in a moist condition. The nursery is preferably sited in a damp ravine adjoining the land it is proposed to plant. A layer of *lalang* grass is laid over the cuttings to conserve moisture, and watering is undertaken as may be found necessary. By this means the cuttings root in three weeks and when transplanted, at about six weeks, form a comparatively regular stand. If the cuttings are planted direct into the field, it is advisable to remove the leaves to prevent the stems from drying from excessive transpiration. It is

*The following is a chapter of a book on Malayan agriculture to be published shortly by the Department of Agriculture, S.S. and F.M.S. It is printed in this place in response to numerous requests for a summary of information on derris.

generally found that if the cuttings are planted without the use of a nursery, a number die; they should be replaced as early as possible by fresh cuttings so that an even stand is eventually obtained.

The cuttings are planted in a slanting direction, with about two-thirds of the length of the stem below the surface.

The method adopted by Chinese market gardeners is to plant long cuttings, twisted into a circle, at distances of about 6 feet apart and to allow the plants to ramble over the ground. During growth, pig manure is applied to the soil. The crop is not harvested at one time, but roots are lifted as required.

Derris should be planted in a light soil of a sandy nature. Heavy clay soils are not recommended, owing to the difficulty experienced in harvesting the roots under such conditions. The land should be flat or gently undulating; steeply sloping land should not be selected owing to the extreme danger of soil erosion.

When the cuttings have rooted in the nursery bed they are planted out in ridges at a distance of 3 feet apart, giving 4,840 plants per acre. The soil should receive a preliminary cultivation and be worked up into a fine tilth during the operation of ridging.

Derris is frequently planted as a catch crop with such permanent forms of cultivation as rubber and oil palm. In view of the increasing importance of the root as an insecticide, it is probable that it will be more seriously considered as a sole crop, or as a rotation crop.

Harvesting.

The toxicity of derris roots varies according to their age; it is most important, therefore, that harvesting should take place at the correct stage of maturity. Experiments have shewn that, taking into account both the yield of root and the toxicity, the optimum age for harvesting is when the plant is about 24 months old.

At the time of harvesting, the stems are cut and drawn on one side. Neither the stems nor leaves have any toxic value. The entire roots are then lifted, cleaned of soil and tied into bundles. It is important to harvest the smaller roots as the percentage of toxic principle contained in them is higher than that of the larger roots. The thickness of the roots should not greatly exceed that of a pencil.

The roots are sun-dried and baled. Sun-drying may take from 7 to 15 days, according to season. Where derris is produced on a large scale, a special flue-heated drying chamber is employed, in which the roots, after being chopped into 5 to 6 inch lengths, are dried at a temperature of 130°F. in about three-and-a-half days. The bale measures approximately 42 inches by 30 inches by 28 inches and contains about 250 lbs. of dried root. It is essential to bale the root immediately after drying, otherwise it is liable to attacks of boring beetles.

The yield of air-dried roots is approximately 45 per cent. of the weight of fresh root. The moisture content of the air-dried product is about 10 per cent. Under suitable conditions, the yield of air-dried root is about 1,000 to 1,200 lbs. per acre.

Pests and Diseases.

Derris is subject to considerable injury by numerous insects both in the field and in storage. The most serious of the field pests is a Chrysomelid beetle, *Craniotectus corbetti* Laboiss., which attacks the leaves. The beetle readily succumbs to a spray consising of pyrethum powder 1.67 lbs., soap 1.67 lb., petroleum 0.8 gallons and water 40 gallons. The total cost of application, including material and wages, amounts to $1.70 to $2.00 per acre. The spray would be reduced in cost and would probably prove equally satisfactory if petroleum were omitted.

Dried derris is liable to damage by several species of beetles in both the larval and adult stages. The adult beetles will attack the root a few days after harvesting, but prefer the very dry root. They lay their eggs in cracks and irregularities on the outside of the root, and the larvae, on hatching, bore into the root and reduce it to powder.

Infestation is not always apparent as it is only the adults which eject frass from their tunnels; it is therefore necessary to take samples of root and split them to ascertain whether beetle larvae or adults are present.

Unless the store is provided with windows covered with wire gauze of 1 mm. mesh, and with doors that fit perfectly, the protection of the crop against infestation by beetles is almost impossible.

Complete elimination of infestation can be secured if the root is ground to powder and packed in tins. Another method is to cut the dried root into pieces of about 2 inches in length which are then packed in plywood chests. A chest measuring 19 x 19 x 24 inches will hold about 100 lbs. of dried root. If this method is used packing must be carried out expeditiously after drying.

The beetles and larvae are destroyed if the infested roots are exposed to bright sunlight for about five hours.

Fumigation with carbon bisulphide is also recommended. The roots must be treated in a room which is sufficiently air-tight to ensure the minimum escape of vapour, and fumigation extended for a period of 72 hours. The quantity of carbon bisulphide necessary will be 2 to 3 pounds per 1,000 cubic feet.

Subjecting infested root to heat for three days is also a satisfactory method of destroying the borers, and, if the crop is being grown on a rubber plantation, it will be found convenient to use the smoke-house for this purpose.

From the above account, it will be realised that the aim must be to obtain an insect-free product, and to attain this object the efficient storage of the root to prevent the beetles from gaining access is of first importance.

No serious fungus diseases have been recorded.

Cost of Production.

It is estimated that under favourable conditions, the total cost of production of dried derris may be from 18 to 20 cents per lb., of which 10 cents represents the cost of harvesting, drying and packing and 8 to 10 cents planting and cultivation.

Toxicity.

The utility of derris root depends on its toxic content. Knowledge of the toxic principles of the root is as yet incomplete, but considerable advances in this direction have been made in recent years, and four toxic compounds have been isolated, *viz.*: rotenone, deguelin, tephrosin and toxicarol. It was thought at one time that rotenone was by far the most important of these compounds, and this opinion appears still to be largely held in the United States of America, for which reason consignments of roots to that country are valued on their rotenone content. On the other hand, valuation based on the total amount of ether extract is employed by importers in the United Kingdom.

Recent investigations in the Department of Agriculture indicate that against certain insects, rotenone is not a reliable index of the toxicity, there being other compounds in the roots which are effective and which are represented in the total ether extract. The opinion is advanced, therefore, that buyers of derris would be well advised to value the root on the total ether extract rather than on rotenone content.

Derris elliptica appears to offer the best possibilities for commercial cultivation, since buyers who insist on rotenone favour this species as the rotenone content is about 7 per cent., while the total ether extract is about 25 per cent. The roots of *Derris malaccensis* give a high ether extract, but a low rotenone content. The amount of crude rotenone in roots of this species is about 1 per cent., although the ether extract is usually about 20 to 25 per cent., and therefore suitable for sale on the United Kingdom market.

Uses.

The principal use of derris is as an insecticide. It is one of the essential ingredients of several proprietary insecticides used as dusts and sprays.

To prepare an extract of the root for use on a small scale, the Chinese and Malays pound the root to a pulp under water, using about 1 lb. to 18 gallons of water. The resultant milky liquid is then sprayed on the plants. It has been stated that the toxicity of this liquid decreases on keeping, but recent experiments conducted by the Department of Agriculture do not confirm this statement. Derris may also be applied in a finely divided condition, known as a dust, and it is in this form that it is frequently presented for commercial application.

Derris is an efficient contact insecticide against certain classes of insect, but it appears to be less effective as a stomach poison. The indications are that it acts as a repellant to certain insects, the nervous system probably being affected through the integument. It also appears to be toxic to insects without actual contact, indicating that it yields a volatile poisonous substance.

The literature on derris is a growing one; information concerning its effectiveness by various methods of extraction and application and against a wide range of insect pests is at present scattered through many scientific publications. The results of experiments in various parts of the world are leading to more precise information, pointing not only to its extended use and to better methods of application, but also to its limitations. It is not claimed for derris that it is effective against all insects, but knowledge of the species of insects against which it is effective is rapidly increasing.

Amongst uses to which derris has been put may be mentioned the following:—An aqueous solution of rotenone has been found to be effective against thrips, white fly larvae, leaf-hoppers, larvae of beetles, and tent caterpillars. The dust form, with a carrier of diatomaceous earth intimately mixed with precipitated rotenone has been successfully employed against chicken lice, roaches and cabbage worms. Injury to peaches and apples by *Popillia japonica* Newn. was considerably reduced by derris root spray applied weekly, and a derris-soap wash consisting of derris powder 1 lb., soft soap ¼ lb., water 1 gallon, has been used with considerable success in England against the warble fly pest of cattle.

Marketing and Trade.

Practically all the tuba root of commerce is derived from the Malayan Archipelago. The area in Malaya is estimated to be 3,500 acres, of which 1,075 acres are planted as a sole crop, the remainder being interplanted with more permanent forms of cultivation.

The exports have steadily increased during the past three years. Total exports in 1931 were 98 tons, valued at $53,633; in 1932 they were 210 tons valued at $92,334; and in 1933 they amounted to 642 tons, valued at $282,795.

Greater knowledge of the use of derris and also of its limitations as an insecticide are in a large measure responsible for this increase in demand, but the increased sales are also due to improved methods of packing and to an improvement in the product itself. The cultivation by responsible persons has also given greater confidence in its value. There is less likelihood of adulteration than formerly and greater effort is made to cultivate varieties with a high toxic content in view of the fact that sales are now generally based on chemical analysis.

At the time of writing the Singapore price of roots sold on ether extract basis is $42 per picul, and roots sold on rotenone content $53 per picul (These prices are equal to 31½ cents and 40 cents per lb. respectively). At these prices derris cultivation shews a profit. The future of the market for

all agricultural products is uncertain, but it would appear that the prospects of an increased demand for tuba root compare very favourably with those of other raw materials.

References.

The Malayan Agricultural Journal:

Vol. XIII, No. 10—Investigations on Tuba.

Vol. XIV, No. 3—Marketing of Derris.

Vol. XVII, No. 10—Variations in the amount of Ether Extract of Tuba Root (*Derris malaccensis*).

Vol. XVIII, No. 9—The American Market for Tuba Root (*Derris elliptica*).

Vol. XVIII, No. 11—A Major Pest of Tuba.

Vol. XIX, No. 2—The Active Principle of Tuba Root and Methods of Extraction.

Vol. XIX, No. 6—Derris Root Insecticides.

Vol. XX, No. 10—The Rotenone Content of Malayan Tuba Root.

Vol. XX, No. 11—Seeding of *Derris elliptica*.

Vol. XXI, No. 2—The Use of Derris in the Control of Warble Flies.

Vol. XXII, No. 3—The Sources of Tuba in the Malay Peninsula.

Vol. XXII, No. 5—Derris Root as a Netherlands India Export Product.

Vol. XXII. No. 8—Control of Insect Pests in Stored Derris.

Special Bulletins, Scientific Series:

No. 12—The Valuation of Tuba Root.

No. 14—Coleopterous Pests of Stored Derris in Malaya.

No. 16—The Toxic Value of *Derris* Spp.

CHEMICAL COMPOSITION OF CERTAIN FODDER PLANTS FROM CAMERON HIGHLANDS

BY

C. D. V. GEORGI,

Acting Agricultural Chemist.

A visit was made recently to Cameron Highlands for the purpose of collecting for analysis samples of various fodder plants likely to prove useful for feeding cattle, since the Highlands would appear to offer certain possibilities for dairy farming.

It is realized that the results of the present analyses can only be regarded as preliminary as far as the general question of the establishment of such fodder plants is concerned, since no records are available regarding yields.

The fodder plants included in the investigation were as follows:—

(*a*) Fodder Grasses and Clovers.

(i) Guinea grass.
(ii) Dutch clover.
(iii) Persian clover.
(iv) Red clover.

(*b*) Pasture Grasses.

(i) Buffalo grass.
(ii) Dallis grass.
(iii) Kikuyu grass.

The results of the analyses are shown in Table I, comparable figures being added where possible.

The following observations are offered on the results:

(*a*) (i) *Guinea Grass.*—Comparison with the results of analysis for this grass when cultivated at the Central Experiment Station, Serdang, indicates, as would be expected, a slower rate of growth on the Highlands, the composition of three weeks old Guinea grass at Cameron Highlands being similar to that for grass cut at weekly intervals at Serdang.

Experiments at Serdang showed that it was not economic to maintain a weekly interval of cutting (1); it will be interesting to see whether this also applies to a three-weekly interval of cutting on the Highlands.

(*a*) (ii)-(iv) *Clovers.*—The figures for clovers call for no special comment, the results of analysis, for example, for red clover being in close agreement with those found for this fodder plant cultivated in Europe.

(*b*) (i) *Buffalo Grass.*—The figures for this grass indicate a close similarity as regards crude nutrients with Guinea grass when cut at three-weekly intervals at Serdang. Assuming therefore that the grass is palatable, it would appear to offer possibilities as a pasture grass on the Highlands.

(*b*) (iii) *Kikuyu Grass.*—The results of analysis are in close agreement with those found for Guinea grass.

In this connexion it is interesting to note that this grass, which has proved to be of little service at Serdang (2), should give such promising results on the Highlands. As far as could be judged the growth was sufficiently strong to form a compact pasturage.

In conclusion the writer wishes to thank the Manager of Major Doyle's Veterinary Establishment, Tanah Rata, and Mr. J. Irving, Blue Valley, for their kindness in providing the necessary samples.

References.

(1) Greenstreet, V. R. and Greig, J. L. Manurial Experiments with Guinea Grass at Serdang, *Malayan Agricultural Journal*, Vol. XXI, No. 11, November 1933, page 543.

(2) Guide to the Government Experimental Plantation, Serdang, F.M.S. January 1931, page 101.

TABLE I.

Results of Analysis of Fodder Plants from Cameron Highlands.

Details of Fodder Plants.	Botanical Name.	Moisture*	Crude Protein.	Crude Fat.	Nitrogen-free Extract.	Crude Fibre.	Ash.	Remarks.
		per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	
(*a*) *Fodder Grasses and Clovers.*								
Guinea grass	*Panicum maximum*	79.0	4.7	0.5	8.3	5.1	2.4	Cut after three weeks' growth.
		79.0	4.3	0.2	7.3	5.1	4.1	Grass cut at weekly intervals at Serdang.
Dutch clover		79.0	4.4	0.3	9.3	5.0	2.0	In flower.
Persian clover	*Trifolium resupinatum*	79.0	3.4	0.3	9.7	5.7	1.9	In flower.
Red clover	*Trifolium pratense*	79.0	4.2	0.3	9.9	5.0	1.6	In flower.
		79.0	3.4	0.7	9.4	5.9	1.6	In flower.†
(*b*) *Pasture Grasses.*								
Buffalo grass	*Paspalum conjugatum*	79.0	3.3	0.2	9.6	5.7	2.2	In flower.
		79.0	3.1	0.2	7.9	5.9	3.9	Guinea grass cut at three-weekly intervals at Serdang.
Dallis grass	*Paspalum dilatatum*	79.0	2.6	0.3	9.7	6.6	1.8	In flower.
Kikuyu grass	*Pennisetum Clandestinum*	79.0	5.1	0.4	8.4	4.9	2.2	Cut after three weeks' growth.

* Owing to the impracticability of commencing the analyses with fresh material, an arbitrary figure of 79 per cent., based on results obtained with fresh grass from the Central Experiment Station, Serdang, has been assumed for the moisture content in all cases.

† Figures for average red clover in Europe cut in flower abstracted from O. Kellner "The Scientific Feeding of Animals".

THE SMALL-HOLDERS' ADVISORY SERVICE OF THE RUBBER RESEARCH INSTITUTE OF MALAYA.

Following a recommendation contained in the Report of the Commission of Enquiry into the affairs of the Rubber Research Institute of Malaya, the Board of the Institute, in co-operation with the Department of Agriculture, inaugurated, in May, 1934, an advisory service for the benefit, primarily, of the owners of rubber small holdings, and the service is also available to all Asiatic owners whose knowledge of English is insufficient to allow of their appreciating the literature issued by the Institute.

The personnel of the service consists at present of twelve Malay and two Indian officers under the title of Asiatic Rubber Instructors. The scheme provides for 22 Instructors, comprising 14 Malays, 6 Chinese and 2 Indians, and it is hoped that the cadre will be completed in 1936.

The Instructors were selected, on the recommendation of the Director of Agriculture, S.S. and Adviser on Agriculture, Malay States, from students who had taken the full course of training in agriculture at the School of Agriculture, Serdang, and had satisfactorily passed the final examination for the Diploma of the School. After passing out, the selected candidates were given a two months' refresher course by officers of the Rubber Research Institute, the Department of Agriculture and the Co-operative Societies Department in relation to problems connected with rubber cultivation, principles of co-operation and methods of conveying instruction and advice to small-holders. They were then posted to various Districts in charge of Agricultural Officers of the Department of Agriculture.

The Instructors are in the service of the Rubber Research Institute but for convenience of administration they work under the Field Officers of the Department of Agriculture, and the Rubber Research Institute is responsible for all technical advice by the Instructors.

Instructors have been posted to Districts as follows:—

Province Wellesley and Penang (Butterworth)	1	Malay
Perak North and Central (Kuala Kangsar and Taiping)	2	,,
Perak South (Tapah)	1	Indian
Selangor (Kuala Lumpur)	1	,,
Selangor (Kuala Lumpur)	1	Malay
Negri Sembilan (Seremban)	1	,,
Pahang Central (Kuala Lipis)	1	,,
Pahang East (Kuantan)	1	,,
Pahang East (Kuantan) lent temporarily to Trengganu	1	,,
Kelantan (Kota Bharu)	1	,,
Kedah (Kulim)	1	,,

Johore South (Johore Bahru)	... 1	Malay
Johore North (Muar)	... 1	„
Malacca (Malacca)	... 1	„

Each serves in a particular *mukim* or District for as long as is considered requisite (at least six months) and is then transferred, but always under the supervision of the State Agricultural Officer. Up to date (August 1935) no Chinese students from the School of Agriculture have been available, but it is hoped that it may be possible to make some appointments in 1936.

The duty of the Instructors is to advise small-holders in all matters relating to, *inter alia,* the preparation of a better grade of sheet rubber, improvement of tapping and the control of diseases of the rubber tree. It is stressed that these Instructors are essentially advisory officers and have no legal powers to enforce the control of disease under the Agricultural Pests Enactment. They keep in touch with the Institute by means of monthly reports, and the latest advice on technical matters is furnished by the Institute direct to the Instructors by means of letters and circulars.

Indications to date are that the Instructors are taking an intelligent interest in their work and that considerable progress has been made in assisting small-holders, particularly in regard to the preparation of an improved product.

The advice and instruction given by the Instructors is augmented by means of lectures and lantern slides through the medium of a Rural Lecture Caravan operated jointly by the Co-operative Societies Department, the Department of Agriculture and the Rubber Research Institute, which makes extensive tours of rural districts. Information is also disseminated by means of leaflets prepared by the Institute for distribution by the Instructors, and by means of the vernacular publications in Malay and Chinese issued by the Department of Agriculture, to which the Institute contributes articles. In addition, propaganda is extended by means of exhibits and demonstrations at the various District Agricultural Shows which are held from time to time throughout Malaya. These Shows are usually attended by the Asiatic Rubber Instructors, who are available to all interested.

VEGETATIVE PROPAGATION OF COFFEE.*

One of the first things noticed in any coffee plantation in Kenya is the extremely variable population. This is due to the heterogeneous nature of seedling material; even that from a 'selfed' tree shows marked variations. There are two methods by which this variation could be overcome, by breeding and by vegetative propagation. The breeding of pure lines of coffee seed is very slow and entails many years' work covering several generations; it is therefore unsatisfactory. In consequence, some three years ago, our attention was drawn to the second method. At that time much success was being obtained with the reproduction by asexual means of other tropical crops, and it was considered that it might also be applied to *C. arabica*. It is here proposed to deal with the work which has been conducted to date.

Many possible methods of vegetative propagation have been under experiment, the results of which are dealt with under their separate headings. It should be noted that, owing to the marked polarity of coffee, all material used for cuttings or as scion wood for grafting is taken from vertical growth. Lateral wood produced only low-growing, flattened trees.

Cuttings.—It is of the greatest interest and importance to note how very closely results obtained here with coffee correspond to those obtained with cacao in Trinidad (1). With the exception of slight variations in technique, the raising of clonal material of these two crops appears to be closely related and thus any further work conducted in Trinidad should be followed by those working with coffee.

Whilst the grafting of coffee has been practised in some countries, notably Java (2, 3) for many years, it is remarkable that so little work has been conducted on the propagation of coffee by cuttings. This may be due to the belief that cuttings do not produce good root-systems, or that they do not have the traditional tap-root of the seedling. That the seedling seldom produces a true tap-root but relies on a number of deep-rooting verticals is now proved, so no importance can be attached to this theory. The former suggestion is a possibility which cannot be overlooked and merits further investigation. The results of the experiments so far, nevertheless indicate that the root-system of a 'cutting' compares very favourably with that of a seedling tree and that trees 2 to 3 years old raised from cuttings, are comparable with seedling trees of the same age.

(*a*) *Hardwood.*—At the Scott Agricultural Laboratories, Nairobi, where most of the early work has been carried out, many hundreds of different types of hardwood cuttings have been planted out in open nurseries without success. In another district in Kenya with very different climatic conditions—heavier rainfall being possibly the chief factor—a coffee planter has been highly successful with this type of cutting, the material used being prunings from trees grown on the Multiple-Stem system. Each cutting was approximately 2

* By S. Gillett, Agricultural Officer and Experimentalist, Kenya, published in *The Empire Journal of Experimental Agriculture*, Vol. III No. II, July 1935.

ft. long and about 1 to 1½ in. in diameter. How these cuttings will behave when they become mature trees must await further investigation, but it is interesting to note that they are already producing a prolific root-system.

(*b*) *Softwood.*—The propagation of this type of cutting entails the use of a closed frame or propagator. Several different propagators have been tested. That which is most suitable to local conditions consists of frames artificially heated by ordinary 'hurricane' lamps in chambers beneath and with a canopy overhead. Sand, thoroughly washed and steam-sterilized, is used as the rooting medium.

The type of cutting is of the utmost importance. That which has given the greatest success, although termed softwood, really consists of a tip, having semi-hardwood at the base and allowed to retain its young tip leaves. The cuttings used are 6 to 9 in. long and more than ¼ in. in diameter. Very suitable material will often be found growing as a bunch of suckers on a stumped tree, generally in the centre under dense shade. Attempts are now being made to induce this type of growth on a larger scale by various methods—shading, etc. Since the tip leaves must be retained, a high humidity must be maintained in the propagator and thus the frames are opened up for a few minutes only each morning. The rooting-medium, which is kept at a temperature between 68° and 72°F., requires watering about twice a week; on the other mornings the leaves of the cuttings are subjected to a fine spray of water in order to keep them fresh. Rooting may be expected in 3 to 4 months. Attempts have been made to stimulate the initiation of root-growth by treating the cuttings with certain gases (4, 5) prior to placing them in the propagators, but so far no success has been recorded.

(*c*) *Root and Leaf Cuttings.*—All attempts to propagate these types of cuttings have failed.

(*d*) *A Modified Form of Layering.*—Both correct layering and marcotting gave success during the first experiments conducted, but, owing to the tedious nature of the work, and the slow rate at which it would be possible to raise large clonal populations, other methods were sought. Early work proved that if suckers, growing from an old stumped tree, were ring-barked near the parent stump and then etiolated, they would root with comparative ease, provided suitable weather conditions prevailed. This indicated that if some method could be found whereby the parent material could be made to produce a larger area for the production of sucker-growth, little difficulty would be experienced in raising large clonal populations. Thus a technique has been evolved and whilst, owing to drought conditions, only early observations can be recorded, it is satisfactory to note that these are most hopeful. The following is the method adopted. A rooted cutting from a selected tree is planted out in a nursery at an angle of approximately 25 degrees from the horizontal. By keeping it pegged down, it will continue to grow in this plane. As this

plant grows, suckers come away from the axillary buds. When about 12 in. high they are ring-barked at the base and soil banked round them. When rooted, the soil is removed and the sucker cut away from the parent plant, which again will produce further cycles of suckers, for similar treatment. In the first cycle only a few of the rooted suckers should be removed, the remainder being pegged over at right angles to the original plant to provide a larger area for the production of rooting-material in the second and subsequent cycles. Experimentation has shown that earthing up must not be carried out until the suckers are ready for rooting, and even then it is necessary to ring-bark each sucker.

Budding.—When the study of the vegetative propagation of coffee was started, considerable attention was given to the possibilities of budding, but as it has been found that the technique presents several difficulties, the method has been abandoned in favour of grafting. It is of interest to note that in referring to budding, Marshall (6) says: "The union of stock and scion is much weaker than when grafting is used. In heavy wind the entire growth is liable to break back to where the original bud was inserted."

Grafting.—Grafting has been widely used in Java where, due to the self-sterility of *robusta* coffee, decreased yields have always been recorded from monoclonal plantations (7). This difficulty is now being overcome by the interplanting of different clones or by the introduction of a number of seedling trees. Fortunately, *arabica* coffee, being a self-fertilized plant, will not present the same problem. Considerable success has already been achieved with different methods of grafting in Kenya.

Grafting by Inarching.—Methods of inarching young seedlings in the nursery and of inarching one-year-old plants upon old stumped trees in the field were first attempted with considerable success by Rogers, Superintendent of Plantations, at Amani (8). His methods have been successfully adopted here and it would appear that either system is an easy way of grafting one variety of coffee upon another (*arabica* on *robusta*). Unfortunately with this method both scion and stock must be seedling material, an arrangement by which little ultimate gain can be obtained.

Cleft-grafting.—Most attention has been paid to this form of grafting, as by this method it is possible to graft clonal scion-material upon seedling stocks. Large numbers of grafts have been made in establishing a technique which gives a high percentage of successful unions. From observations made in the progress of this work the following conclusions have been made regarding the technique:

(*a*) The larger the stock and scion the easier it is to make a successful graft. Seedling stocks about 18 to 24 months old are much easier to graft upon than younger material.

(*b*) The stock should be cut just above or across a node and a cleft about 2 in. deep made between the buds.

(*c*) The scion is cut in the form of a wedge beginning on either side of a bud.

(*d*) The scion wood must be active at the time of grafting.

(*e*) The protection, which must be applied to prevent movement between the stock and scion until union has been made, should vary according to the time of the year at which the graft is made. It has been found that the best time of the year for grafting at the Scott Agricultural Laboratories is during the cool, dry weather (June-October). In June, when sap flows freely from the stock, it will be advisable to bind the graft with gunny string only. Later in the season, at a time when there is little sap flowing and the weather is warmer, all cut surfaces, including the tip of the scion, should be protected with grafting wax.

(*f*) In all cases the whole graft should be protected for a period of about three weeks by covering it with a loose waxed-paper cover.

Grafting in the Field upon Old Stocks.—All attempts at rind-grafting upon old stocks proved unsuccessful, so that other ways had to be exploited. The method adopted, which is proving successful, is that of grafting on sucker-growth encouraged from the base of the tree. When the sucker has obtained sufficient size and maturity it is treated in precisely the same manner as are seedling stocks in the nursery. The ordinary cleft-graft is made as described above and is waxed and covered with a paper cover as before. The tree may be stumped back to the sucker either before grafting or afterwards. If it is left until after grafting the natural shade thus formed will assist the newly made graft in its early days. Care must nevertheless be taken to stump before the graft makes too much growth or it will be drawn up and tend to become whippy. The growth of a graft on an old-established root-stock is remarkably rapid.

Sufficient work has been carried out to show that coffee can be reproduced successfully by asexual means in Kenya. It would not be wise, however, to recommend it for field practice before further experiments have been conducted to study the many problems involved in mass production.

Among those which have already been forced to receive attention is the relationship between stock and scion and the effect of root-stocks of other *Coffea* species upon *C. arabica*. The behaviour of mature trees produced vegetatively deserves close attention and must be compared with trees raised from seed, both as regards variations in habit and in yield.

Acknowledgments.

The writer is indebted to officers of the Department of Agriculture in Kenya, Uganda, and Tanganyika Territory, and the East African Agricultural Research Station, Amani, for their advice and assistance at all times; to Mr.

E. C. M. Green, Field Assistant, for his care of the field and breeding work; to Mr. L. Burton, Laboratory Assistant for the photographs reproduced; and to Mr. V. A. Beckley for kindly correcting the proofs of this paper.

References.

1. E. E. Cheesman, The Vegetation Propagation of Cacao. Empire J. Expt. Agric., 1934, *2*, 40-50.
2. F. P. Ferwerda, Vegetative Propagation of Coffee. Empire J. Expt. Agric., 1934, *2*, 189-99.
3. D. J. S. Cramer, Early Experiments on Grafting Coffee in Java. Empire J. Expt. Agric., 1934. *2*, 200-4.
4. P. W. Zemmerman, William Crocker, and A. E. Hitchcock, Initiation and Stimulation of Roots from Exposure of Plants to Carbon Monoxide Gas. Contributions from Boyce Thompson Institute, *5*, No. 1.
5. P. W. Zemmerman and A. E. Hitchcock, Initiation and Stimulation of Adventitious Roots caused by Unsaturated Hydrocarbon Gases. Contributions from Boyce Thompson Institute, *5*, No. 3.
6. T. H. Marshall, Coffee Grafting and Budding. Dept. Agric., Tanganyika Territory.
7. F. P. Ferwerda, Grafts *v.* Seedlings in Coffee. De Bergcultures, 1932, *6*, 629-44.
8. F. M. Rogers. Report of the Superintendent of Plantations, Amani. Sixth Annual Report, 1933-4.

Reviews.

The Pineapple.

M. O. Johnson, Paradise of the Pacific Press, Honolulu, Hawaii, U.S.A. 306 pp., 94 figs. Price $5 (gold) post free.

The literature concerning the pineapple is extensive, as is shewn by the list of references covering ten pages included in this book. The author has performed a valuable service to the pineapple-canning industry in summarizing much of the scattered information in a book which he states is an attempt at a compromise between a purely technical publication and one possessing some popular interest. He has at all events succeeded in producing a very readable account which will be valued by those connected with the pineapple industry in many countries.

The author is well-qualified for the task which he has so ably performed by reason of his long association with the industry in Hawaii. He concerns himself, as may be expected, mainly with Hawaiian conditions, but this does not detract from the book, for however loyal one might wish to be to one's local industry, the fact remains and must be acknowledged that the Hawaiian pineapple industry not only surpasses that of other countries in magnitude, but the technical skill exhibited in the production and canning of pines in that country is pre-eminent. But while the book is based on the Hawaiian industry, the methods there employed are contrasted with those in other pineapple-producing countries.

Earlier chapters deal adequately with general characteristics of the pine-apple; varieties, seedling and bud selection work, soils, fertilization, planting, and care of the plants in the field.

The writer deals in detail only with Hawaiian soils. They are characteristically lateritic in type, the nearest Malayan counterpart being the Raub Series Soils, on which, as far as is known, pineapples have not been tried out.

The frequent presence of manganese in Hawaii necessitates treatment with iron salts to prevent chlorosis. Chlorosis from such a cause need never be feared in Malaya.

Soils appear to be of the laterite type in the pineapple districts of Cuba, while in Florida it would appear that the crop is grown largely on coral or silica sands with heavy manuring, the manure supplied providing practically all the plant food.

In the brief description of pineapple soils in Malaya no areas entirely devoted to pines seem to be noted, the chief impression derived being that they are almost entirely inter-planted with rubber.

Pineapples growing on peat seems to have come as a surprise, yet as far as this country is concerned, there are thousands of acres on which pines thrive for years, which consist almost entirely of organic remains. The

resemblance observed between the red pineapple soil of Johore and those of Hawaii is more apparent than real, the latter being much richer in plant nutrients generally, and much higher in iron and lower in silica.

The general conclusion to be arrived at from the chapter on soils is that the range is very wide, a fact which must be obvious to the most casual observer in Malaya.

Considerable attention is given to the use of paper mulching, which is standard practice in Hawaii, and for which are claimed higher yields and the suppression of weeds. It must not be inferred that similar results would attend the adoption of this method in Malaya; in fact, experiments at Singapore shewed that although the mulch gave an increased yield, its cost was quite disproportionate to its value, while a higher yield at lower cost was obtained by manuring and cultivation. The high cost of labour in Hawaii is a favourable factor in the use of a mulch which reduces weeding costs, whereas in Malaya, cheap labour renders this factor of less importance

The value of mulching depends not only on relative costs, but on climate. The author has given insufficient consideration to climate especially to rainfall. He states that "temperatures between 60 and 90°F. appear to promote the sturdiest growth". and that "an annual rainfall of 20 to 80 inches a year is favourable". He also admits that "the chief benefit to the pineapple of paper mulching is from the much higher moisture content of the soil under mulch". The reviewers agree with his limits regarding temperature and his view on the value of mulch, but consider that the extremes of rainfall given are so wide as to have merited the author's closer investigation. Pineapples in Hawaii are grown under conditions which approximate to the lower limit of rainfall, whereas in Malaya they are grown under conditions of rainfall around the higher limit. (In Singapore the annual rainfall is 95 inches and in the pineapple growing districts of south Johore it is from 96 to 126 inches a year). Doubtless the value of any particular variety of pineapple for canning purpose will vary when grown under different climatic conditions. This may well be the reason why varieties which have been found suitable for the purpose in other regions have been found unsuitable when grown under Malayan conditions.

It would require personal knowledge of conditions in each centre of production for a writer to be in a position adequately to compare the relative merits or demerits of systems employed. While it is probable that no one authority on the subject possesses this intimate knowledge, it is possible for the reader to pursue a study of the systems employed elsewhere and to consider if, or how far, the knowledge and experience gained by others may be applied or adapted to the particular conditions with which he is concerned. It is in this light that the present book should be studied and is recommended to those in Malaya who are connected in any way with the pineapple industry.

From the point of view of readers in Malaya, the fact is to be deplored that about 90 pages are devoted to pests and diseases—subjects which, happily,

cause no anxiety in Malaya—and only 11 pages of reading matter to the subject of canning. Had the author given the same consideration to the latter subject—of which he must have a very intimate knowledge—as he has given to the field questions, the work would have been more complete.

The appendices are not the least valuable feature of this work; they include a number of interesting data in tabular form, and a reference list of pineapple varieties covering 21 pages, which not only states the botanical features of each variety, but includes notes on the commercial characteristics of the fruits.

The reviewers hope that the author may at some not too distant date publish a more exhaustive treatise on a subject on which he writes with authority.

D. H. G. & J. H. D.

Annual Report for 1934 of the Rubber Research Institute of Malaya.

Published by the Rubber Research Institute of Malaya, July 1935. 175 pp. Price $1 (Straits).

This publication contains not only the annual reports of the Board and of the Director, but reports of the four Divisions of the Institute, *viz.*: Soils, Botanical, Pathological, Chemical, and the report on the Experiment Station, together with the Report of the London Advisory Committee for Rubber Research (Ceylon and Malaya) and the Report of the Superintendent of Rubber Investigations of the London Advisory Committee. In spite of a reduced research staff, the Institute made steady progress in investigations—both in the laboratories and in the field. In addition, a large amount of advisory work was performed, by post, by numerous visits to estates and by lectures and demonstrations. With a depleted staff, this most important service must have checked, to some extent, the progress of the scientific investigations.

The Report of the Director contains not only a concise summary of the progress of the Institute, but epitomizes the present position regarding a number of subjects of great interest to rubber planters. The attention of planters is directed to his remarks on natural undergrowth in soil regeneration, manuring; botanical investigations—in particular, budding, and physiology of Hevea in relation to latex production; and the chemical investigations. There has been little new to report under the heading of pests and diseases; these are now fairly well known to European and Asiatic planters and no new serious disease or pest has been recorded during the year.

D. H. G.

Rubber Statistics Handbook 1935.

Compiled by the Department of Statistics, S.S. and F.M.S. 102 pp. 1 graph. Government Printing Office, Singapore. Price $1.50 (Straits) or 3s. 6d.

This annual official publication consists of sixty-two tables concerning the acreage, production, imports and exports, and consumption of rubber in Malaya, corrected up to 31st December 1934. It also includes a graph of Singapore daily market prices of rubber throughout the year.

Liaison with the Rubber Controller's Offices has enabled considerable revision of previous statistics of areas on estates of 100 acres and over. This in turn has enabled more accurate data to be obtained of the quantity of rubber produced on estates of 100 acres and over and on small holdings.

The publication is a most useful book of reference.

D. H. G.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

September, 1935.

The Weather.

The wet weather in the second half of August was followed early in September by another dry period, with the result that rainfall for the month was deficient in the greater part of the Peninsula, although the deficiency varied considerably in different localities, being most pronounced in North Kedah, the Central and South Districts of Province Wellesley, Kelantan and Southern Pahang. Conditions were more normal along the coast of Negri Sembilan and Malacca and on the east coast of Pahang. Heavy rains at the end of the month raised the total precipitation around Taiping above the average and made up much of the deficiency on the coast of Selangor and in northern Pahang.

Remarks on Crops.

Padi.—There was no change in the price of padi. Nurseries were lost and planting operations delayed by dry weather in North Kedah and the Central and Southern Districts of Province Wellesley. In other parts of Kedah, the North Districts of Province Wellesley and Penang Island, sufficient rain fell to allow planting operations to proceed normally. The fate of the padi crop in the drier areas is dependent on an early change in the weather.

In parts of Krian also the abnormally dry weather hindered planting, and rendered the prospects of the coming crop uncertain. In most other parts of Perak clearing and transplanting operations progressed satisfactorily, although in many areas work was somewhat behind the scheduled dates owing to water shortage in the early part of the season. The new irrigation area at Bota was planted up satisfactorily and the water supply was well maintained by the pump. The riverine mukims in Lower Perak District were suffering from drought and in consequence the plants grown from seed dibbled into the dry soil were weakly and overrun with weeds. There were, however, extensive areas of dry nurseries in reserve for transplanting in the wet weather. Some 750 gantangs of pure strain padi seed were supplied to these mukims. In the Sungei Manik area clearing and transplanting were being carried out generally, and a little stumping and construction of banks was being done in the older portion. Except in a few localities the water supply was sufficient.

Further felling and clearing was in progress in the Panchang Bedena area and the large drain along the north eastern boundary of the area was

finished. Nurseries were sown and clearing work started. It is anticipated that about 10,000 acres will be planted during the season which has just commenced. Rats have been very numerous and have severely damaged the earlier planted nurseries. Steps have been taken to intensify organized control measures.

In most parts of Negri Sembilan the padi was making good growth and an average crop was anticipated. In parts of Kuala Pilah District, however, planting operations were extremely late. In consequence, the harvest will be late and long drawn out and an average yield is not expected.

In Malacca, planting was nearly completed, except in the coastal mukims of Jasin District where the work was well behind the scheduled dates. The pure strain Siam 29 is stated to be widely grown this season in the Central District in preference to other pure strains under distribution.

In Kelantan the dry weather during September rendered possible a second weeding of the dry padi crop which is expected to give a good yield. On the other hand, wet padi nurseries on dry land sites were in a number of cases killed by the drought. A change in the weather and a well distributed rainfall during the next few months would, however, still render possible a satisfactory wet-padi crop.

In Northern Pahang transplanting was complete in the riverine area and was well advanced elsewhere. Shortage of water, however, caused irregular and slow growth. Minor and localized flooding towards the end of the month caused little actual damage, but enhanced the poor appearance of the padi in several localities. In Southern Pahang flowering commenced about the middle of the month, but owing to drought the growth of the crop was poor. It is anticipated that in this Circle both planted area and yield will be much reduced this season. In Pahang East weather conditions were more favourable and the padi in the planted areas was reported to be doing well. In the new area at Sungei Blat in the Kuantan District and the down-river mukims of Pekan District transplanting was in progress, work in the Sungei Blat area having been delayed for only a fortnight by the dry weather in August.

Rubber.—There was no material change in the price of rubber during the month. An increase in the percentage of small holdings in tapping was recorded from Krian District, part of Negri Sembilan, and the Temerloh and Bentong Districts of Pahang. Two reasons were advanced for this increase. In Krian and Negri Sembilan completion of padi planting was considered to be the cause, in Pahang, completion of padi combined with the approaching issue of export coupons for the fourth quarter of the year. In Selangor, however, the area of small holdings in tapping was reported to have decreased in all Districts owing to lack of coupons. In Ulu Selangor there was a demand for rubber without coupons to balance coupons purchased by dealers, but the price of $7 per picul offered for such rubber renders its sale unprofitable in most cases.

Secondary wintering occurred in parts of Kelantan as a result of the dry weather. In Perak South it was completed during the month. The general condition of small-holdings continued to be satisfactory. Mouldy Rot and other diseases were not much in evidence.

Smoke cabinets erected on the site of the weekly fair at Langgar in Kedah and at Balik Pulau in Penang attracted considerable attention. A Chinese dealer at Balik Pulau when shown samples of sheet made in this cabinet stated that he would give an enhanced price for all sheets of the same quality. Two cabinets were being built by small-holders in the Ulu Langat District, and one in the Kuala Langat District of Selangor.

Coconuts.—There was a steady rise in the price of copra during the month to a figure about 50 cents per picul above that obtainable at the end of August. This resulted in a rise in the price of nuts in Province Wellesley and Krian, but in Bagan Datoh the price weakened slightly. Copra manufacture on improved kilns in Krian and the Province continued steadily, but in Krian two kilns were not operated owing to a temporary local shortage of nuts. The improved kiln at Beserah was also not operated for the same reason. That at Kuala Pahang, however, was working under full pressure.

A very recently improved kiln owned by a Chinese in Bagan Datoh District, which takes the produce from 70 acres, gave promise of success, as the first two trials produced copra of first quality.

A campaign to reduce damage to coconuts by squirrels is in progress in one locality in Malacca. Funds are raised by a levy of 2 coconuts per palm on each coconut holding in the mukim, and nominated persons known to be good shots obtain a reward from the proceeds of nut sales, of 13 cents a tail. Over 300 squirrels are reported to have been shot in less than a month.

Agricultural Stations and Padi Test Stations.

Planting was completed on a number of Padi Test Stations including the new Ampang Tinggi Station in Negri Sembilan. On most others work was progressing satisfactorily, though somewhat handicapped by dry conditions. On the Central Experiment Station, Kelantan, transplanting had to be discontinued when six acres had been planted because the water table was so low that the pumps could not supply water for a larger area.

At the Sungei Manik Station half a mile of bund was constructed to retain water on the higher portion. Clearing was in progress and raft nurseries were planted. At the Sungei Blat Station planting operations were delayed only two weeks by drought. Nurseries were sown, and ploughing with buffaloes was commenced.

The State Agricultural Officer, Negri Sembilan, reports that the experiments with heavy dressings of phosphate manures on the Kendong Plot are unlikely to yield results of much value, as it can distinctly be seen that the movement of water from the south to the north has been sufficient to distribute

the fertilizers over a fairly extensive area comprising all plots within the Latin squares and land some distance outside the squares. This occurred in spite of the fact that all water was run off the plots before the fertilizers were incorporated in the top soil. He concludes that if such experiments are to yield results it will be necessary to bund all the sub-plots. It still remains, however, to be seen how far yields at harvest are affected by this movement of fertilizers.

Satisfactory progress was made in the establishment of the new Agricultural Stations at Ayer Hitam in Penang, Telok Datoh in Selangor, and Raub in Pahang, on all of which the actual planting of crops will commence in the near future.

The Assistant District Officer, Kuantan, and a small party of headmen visited the Sungei Blat Station, and a troop of Malay Boy Scouts visited the Rembau Agricultural Station. Casual visitors to certain Stations are becoming more numerous.

Agricultural Instruction.

The second half-yearly judging of school gardens was in progress during the month in the States of Selangor, Negri Sembilan and Pahang, and the second judging of school padi plots in Krian District was completed.

The Rural Lecture Caravan visited nine centres in Malacca during the period 21st August to 7th September; there were good attendances at all centres. On the 18th September it commenced a tour in Negri Sembilan and visited seven centres in Kuala Pilah District at all of which attendances were again good.

Diseases of Poultry and Goats.

An outbreak of disease, stated to be Fowl Pest or Newcastle Disease, occurred amongst the Rhode Island Red poultry at Bukit Mertajam Agricultural Station. In all, six birds were affected. These were immediately removed from the pens and vigorous disinfection of the houses and pens was carried out. These measures appear to have been effective, as the outbreak was stamped out with the death of three birds only out of a flock of 69 fowls of all ages.

Outbreaks of poultry disease of which the identity is not stated occurred at Alor Pongsu in Krian, and at Selama. Another outbreak of disease, attributed to Fowl Cholera, occurred at Sitiawan, while that previously reported from Lumut was attributed to a virus.

A serious outbreak of contagious pleuro-pneumonia among goats occurred in Krian in consequence of which the District was quarantined. The disease is notifiable. The epidemic is particularly severe in the coastal area.

DEPARTMENTAL NOTES.

Return from Leave of the Adviser on Agriculture.

Dr. H. A. Tempany, C.B.E., Director of Agriculture, Straits Settlements, and Adviser on Agriculture, Malay States, returned from leave on 2nd October, 1935.

Department of Agriculture Headquarters, Pahang.

The headquarters of the State Agricultural Officer, Pahang, were transferred from Kuala Lipis to Raub on 29th September, 1935.

Visits of Acting Adviser on Agriculture.

The Acting Adviser on Agriculture (Mr. F. W. South) visited Malacca from 19th to 22nd September, to attend and deliver a paper at the annual Conference of the Incorporated Society of Planters. He also inspected the Pulau Gadong Padi Experiment Station and the Sungei Udang Agricultural Station and new Farm School buildings.

On the 28th September he judged the fruit section at the Kuala Selangor Agricultural Show.

Conference of the Incorporated Society of Planters.

The annual Conference of the Incorporated Society of Planters was held at Malacca from the 20th to 22nd September. Among the papers read was one by the Acting Adviser on Agriculture (Mr. F. W. South) on "What Crops can be Recommended for Planting under existing Conditions", and one by the Chief Research Officer (Mr. W. N. C. Belgrave) on "Recent Investigations on Oil Palms and Coconuts".

Farm School at Malacca.

The first Farm School has been erected at the Sungei Udang Agricultural Station, Malacca. Its first term commenced on 2nd September 1935 with a full quota of 25 pupils, five of whom hold Government scholarships which provide for free tuition only.

Owing to active propaganda by the Agricultural Officer, Malacca, with the assistance of the Inspector of Schools, ninety applications for admission were received, in consequence of which an entrance examination was held to select the most suitable candidates for admission.

Statistical.

MARKET PRICES.

September, 1935.

Rubber.—The market weakened during September but improved at the close. Spot loose opened in Singapore at 19⅛ cents per lb., fell to 18 5/16 cents on the 17th September, and closed at 19⅜ cents. The Singapore average price for No. 1. X. Rubber Smoked Sheet was 18.89 cents per lb. as compared with 19.40 cents in August. The average price in London for the month was 5.50 pence per lb., and in New York 11.50 cents gold per lb. as compared with 5.72 pence and 11.92 cents gold in August.

Prices paid for small-holders' rubber at three centres during the month are shewn in the following table.

Table I.
Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, September, 1935.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.	
	5	12	19	26	4	11	18	25	4	11
Smoked sheet	23.00	23.15	22.00		22.60	23.12	21.49	22 89		
Unsmoked sheet	22.13	22.00	21.00	21.09					20.76	21.00
Scrap										

Transport by F. M. S. R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent No purchases at Batu Pahat on the 18th and 25th September.

Palm Oil.—The following table shews the trend of the market for the Malayan commodities.

Table II.

Prices of Palm Oil and Palm Kernels.

Date 1935.	Palm Oil in Bulk, c i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
Sept. 6	18. 0. 0	7. 12. 6
„ 13	18. 0. 0	7. 12. 6
„ 20	18. 0. 0	7. 17. 6
„ 27	18. 10. 0	8. 5. 0

Copra.—Prices again shewed an upward tendency, rising steadily throughout September with the exception of a slight set-back in the second week of the month. The sun-dried grade opened at $3.80 per picul and closed at $4.20, the average for the month being $3.98 per picul, as compared with $3.84 in August. The mixed quality improved correspondingly in price, and averaged $3.55 per picul as compared with $3.43 in the previous month.

Copra cake improved slightly in the second half of the month, and averaged $1.56 per picul as compared with $1.50 in August.

Rice.—The average wholesale prices of rice per picul in Singapore for August were as follows:—Siam No. 2 (ordinary) $4.05, Rangoon No. 1, $3.65, Saigon No. 1 $3.62, as compared with July corresponding prices of $4.22, $3.77 and $3.87 Relative prices for August 1934 were: $3.13, $3.16 and $3.17.

The average retail market prices in cents per gantang of No. 2 Siam rice were:—Singapore 32, Penang 23, Malacca 29, remaining unchanged as compared with July.

The average declared trade value of imports of rice in August was $3.72 per picul, as compared with $3.76 in July, and $3.80 in June.

Padi.—The Government Rice Mill at Bagan Serai continued to pay $2 per picul for padi, and the Parit Buntar privately-owned mill paid $2 to $2.10 per picul. In Krian, retail prices of padi were from 5 to 9 cents per gantang; elsewhere in the Peninsula prices ranged from 7 to 14 cents.

Tea.—Eight consignments of Malayan tea were sold on the London market during September; average prices obtained for lowland tea ranged from 10d. to 11¼d. per lb., and a consignment of highland tea was sold at 1s. 1d. per lb.

Average London prices per lb. during September for tea consignments from other countries were as follows:—Ceylon 1s. 2.35d., Java 10.65d., Indian Northern 1s. 4.98d., Indian Southern 11.72d., Sumatra 9.47d.

The latest Colombo average prices available quoted from the *Weekly Tea Market Report,* 24th September 1935, of the Colombo Brokers' Association are as follows:—(prices are in rupee cents per lb.) High Grown Teas 75 cents, Medium Grown Teas 65 cents, Low Grown Teas 61 cents.

Tuba Root (Derris).—The demand for tuba root was dull during September, and there was no change in prices of Malayan roots as compared with the previous month. Roots sold on a basis of rotenone content averaged $51 per picul, and roots sold on a basis of ether extract averaged $37 per picul. Non-Malayan roots weakened considerably, averaging $25 per picul as compared with $32 in August.

Coffee.—There was a slight improvement in prices of coffee in Singapore during September. Sourabaya coffee rose from $13 per picul to close at $14, and Palembang coffee averaged $6.94 as against $6.60 in August.

Local prices of coffee ranged from $16 to $30 per picul, and in Penang robusta coffee was sold at $15 per picul.

Arecanuts.—Prices in Singapore continued an upward trend during September. Average prices per picul were:—Splits $5.31 to $7.19, Sliced $11.19 to $13.69, Red Whole $5.56 to $7.50, Kelantan $6.64, the prices in each range depending upon quality.

The Singapore Chamber of Commerce average prices were:—Best $7.42, Medium $6.92, Mixed $5.92.

Gambier.—Singapore prices remained unchanged throughout September at the previous month's closing levels of Block $5.50 and No. 1 Cube $9.50 per picul. The August average prices were $5.90 and $10.30 respectively.

Pineapples.—A steady volume of business was maintained during the month at the prices fixed by the Packers' Combine in Singapore, which remained unchanged. Prices per case were:—Cubes $3.45, Sliced Flat $3.25, Sliced Tall $3.60.

Fresh fruit prices rose in Singapore, and were: large $3.50, small $3 per 100. Prices in Selangor were from 70 cents to $1 per 100.

Tapioca.—Prices continued unchanged with the exception of a slight rise at the close in Flake Fair. Average prices per picul were: Flake Fair $4.12, Seed Pearl $5.40, Medium Pearl $6.

Sago.—Pearl, Small Fair, continued unchanged at the August closing level of $3.70 per picul, while Flour, Sarawak Fair, improved steadily to average $2.40 per picul. August average prices were $3.74 and $2.27½ respectively.

Mace.—Prices advanced in Singapore during the month, Siouw averaging $92.50 and Amboina $57 per picul, as compared with $82.20 and $56.60 in August.

Nutmegs.—The Singapore market had an upward trend in September. 110's averaged $28 per picul as compared with $27.60 in August. The average prices for 80's, $29 per picul, showed no change in comparison with the previous month, but prices were rising at the close.

Pepper.—Opening at a low level quotations hardened during the month, but this was due to the reluctance of sellers, rather than to any increased buying power. Singapore average prices per picul were: Singapore Black $8.94, Singapore White $16.62, Muntok White $17.50, as compared with $9.75, $17.20 and $18.10 respectively in August.

Cloves.—Quotations remained nominal in Singapore and were unchanged at $35 per picul for both Zanzibar and Amboina.

Cardamoms.—Green cardamoms were quoted during September in the Ceylon Chamber of Commerce weekly reports at 85 rupee cents to R. 1.05 per lb. rising to 95 cents R. 1.12 per lb.

Tobacco.—Prices varied considerably in different parts of the country. The following is the range of prices per picul for the various grades: 1st quality $30 to $50; 2nd quality $25 to $40; 3rd quality $15 to $22. In Kedah, prices ranged from $14 to $50, and in Kelantan 2nd quality tobacco was as high as $50 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.*

August, 1935.

Malaya.—Imports of foreign rice in August were 58,169 tons, and exports 15,650 tons, net imports being 42,519 tons. Net imports for the first eight months of the year totalled 306,216 tons as compared with 302,241 tons in 1934, an increase of 1.3 per cent.†

Of the imports during August, 50 per cent. were consigned to Singapore, 15 per cent. to Penang, 7 per cent. to Malacca, 20 per cent. to the Federated Malay States, and 8 per cent. to the Unfederated Malay States. Of the total, 56 per cent. came from Siam, 33 per cent. from Burma, 10 per cent. from French Indo-China, and 1 per cent. from other countries.

Of the August exports 80 per cent. were consigned to the Netherlands Indies, and 20 per cent. to other countries. The various kinds of rice exported were: Siam 10,152 tons (64.9 per cent.), Burma 4,479 tons (28.6 per cent.), French Indo-China 866 tons (5.5 per cent.), parboiled rice 58 tons (0.4 per cent.), local production 95 tons (0.6 per cent.)

India and Burma. Foreign exports for the period January to July 1935 were 1,222,000 tons as compared with 1,010,000 tons in 1934, an increase of 21 per cent. Of the 1935 exports 4.6 per cent. were to the United Kingdom, 14.4 per cent. to the Continent of Europe, 21.4 per cent. to Ceylon, 32.4 per cent. to the Straits Settlements and the Far East, and 30.2 per cent. to other countries. The respective percentages for 1934 were: 10.2, 19.9, 22.3, 18.4 and 29.2.

Burma's total exports of rice and bran (*Bangkok Times,* 26th August, 1935) from 1st January to 27th July 1935, aggregated 2,372,654 metric tons, as compared with 2,713, 723 metric tons in 1934, a decrease of 12.6 per cent.

Siam.—Exports of rice and rice products from Bangkok in July were 101,416 tons, the cumulative total for the year being 902,041 tons.

Japan.—Rice stocks on 1st August amounted to 3,137,042 tons, a decrease of 26 per cent, as compared with stocks a year ago. (*Trans-Pacific Journal,* 15th August, 1935.)

According to the final figures of the first Formosan rice crop, the area under rice was 732,752 acres, an increase of 2.8 per cent. as compared with the previous year. Production of 607,014 tons represented a decrease of 25,644 tons as compared with the 1934 crop.

French Indo-China.—Entries of padi into Cholon during the first eight months of this year totalled 1,315,130 metric tons, an increase of 18.6 per cent. as compared with 1934. Exports of rice for the same period were 1,359,863 metric tons, an increase of 31.9 per cent.

The Netherlands Indies.—No further information is available since the July Summary.

---

* Abridged from the Rice Summary for August, 1935, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1934.

Ceylon.—Imports for the first eight months of the year totalled 345,422 tons, an increase of 7.5 per cent. as compared with 1934. Of these imports 12.8 per cent. were from British India, 68.9 per cent. from Burma, 1 per cent. from the Straits Settlements, and 17.3 per cent. from other countries. The corresponding 1934 percentages were: 13.9, 63.4, 0.7, and 22.

Europe and America.—Shipments to Europe from the East for the period 1st January to 15th August totalled 610,187 tons, a decrease of 30.4 per cent. as compared with 1934.

Of these shipments 50.2 per cent. were from Burma, 3.9 per cent. from Japan, 38.9 per cent. from Saigon, 5.3 per cent. from Siam, and 1.7 per cent. from Bengal. The 1934 respective percentages were: 40, 5.4, 43.4, 8.8 and 2.4.

Shipments for the Levant from the East during the period 1st January to 26th July totalled 22,709 tons, an increase of 4.6 per cent as compared with 1934.

Shipments for Cuba, West Indies and America during the period 1st January to 27th July were 139,192 tons, an increase of 26.3 per cent.

MALAYAN AGRICULTURAL EXPORTS, AUGUST, 1935.

PRODUCT.	Net Exports in Tons.				
	Year 1934.	Jan-Aug. 1934	Jan-Aug. 1935	August 1934	August 1935
Arecanuts ...	27,336	21,967	14,281	2,373	363*
Coconuts, fresh † ...	100,804†	65,096†	70,244†	6,869†	8,092†
Coconut oil ...	25,485	16,267	21,260	1,758	3,280
Copra ..	95,599	60,525	70,013	6,223	8,461
Gambier, all kinds ...	2,170	1,447	1,769	208	164
Oil cakes ...	11,273	7,310	5,473	202	1,050
Palm kernels ...	3,196	1,886	2,392	222	510
Palm oil ...	15,852	8,724	13,840	1,336	1,764
Pineapples canned ...	66,634	53,864	51,950	5,482	5,911
Rubber ¶ ...	479,371¶	309,784¶	264,790¶	39,369¶	33,809¶
Sago,—flour ...	10,403	4,746	4,747	758	572*
„ —pearl ...	5,058	3,115	3,113	527	451
„ —raw ...	7,079*	4,121*	4,565*	577*	389*
Tapioca,—flake ...	5,761	4,616	1,281	182	145
„ —flour ...	1,842*	1,316*	643*	61*	29*
„ —pearl ...	15,770	10,728	11,511	1,346	1,726
Tuba root ...	481	381½	397	33	36

† hundreds in number. * net imports. ¶ production.

MALAYAN PRODUCTION IN TONS OF PALM OIL AND KERNELS

(As declared by Estates)

Month 1935.	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January ...	1,062.3	339.3	174.0	49.6
February ...	977.1	220.9	161.7	38.5
March ...	1,104.3	334.2	172.6	48.6
April ...	1,008.2	328.0	151.2	40.4
May ...	1,077.1	461.8	158.6	63.1
June ...	1,311.0	724.1	200.9	105.5
July ...	1,901.2	729.0	255.3	109.0
August ..	2,331.5	777.9	345.5	120.0
Total ...	10,773.0	3,915.2	1,619.8	574.7
January to August, 1934 ..	7,802.6	2,876.3	1,280.9	545.5
Total at end of 1934 ...	12,965.0	4,510.0	2,013.0	795.0

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31ST AUGUST, 1935.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1934	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (*a*)		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,691	294	.7	13,372	29.9	796	1.8	13,666	30.6
Malacca	123,793	2,262	1.8	24,515	19.8	3,684	3.0	26,777	21.6
Penang Island	2,593	...	...	301	11.6	134	5.2	301	11.6
Singapore Island	33,312	4,030	12.1	7,042	21.1	644	1.9	11,072	33.2
Total S.S. ...	204,389	6,586	3.2	45,230	22.1	5,258	2.6	51,816	25.3
FEDERATED MALAY STATES :—									
Perak	295,895	7,771	2.6	51,427	17.4	13,093	4.4	59,198	20.0
Selangor	345,100	10,521	3.0	47,999	13.9	13,033	3.8	58,520	16.9
Negri Sembilan	258,381	12,385	4.8	41,575	16.1	15,256	5.9	53,960	20.9
Pahang	75,912	11,022	14.5	19,946	26.3	13,710	18.1	30,968	40.8
Total F.M.S. ...	975,288	41,699	4.3	160,947	16.5	55,092	5.6	202,646	20.8
UNFEDERATED MALAY STATES :—									
Johore	417,633	18,333	4.4	59,598	14.3	35,826	8.6	77,931	18.7
Kedah	199,180	3,880	1.9	22,423	11.3	19,349	9.7	26,303	13.2
Kelantan	28,891	403	1.4	9,105	31.5	5,359	18.5	9,508	32.9
Trengganu (*b*)	4,643	Nil	Nil	15	0.3	5	0.1	15	0.3
Perlis (*c*)	1,206	Nil	Nil	505	41.9	25	2.1	505	41.9
Brunei	(*d*) 4,991	Nil	Nil	1,614	32.3	877	17.6	1,614	32.3
Total U.M.S. ...	656,544	22,616	3.4	93,260	14.2	61,441	9.4	115,876	17.6
TOTAL MALAYA ...	1,836,221	70,901	3.9	299,437	16.3	121,791	6.6	370,338	20.2

Notes :—(*a*) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
(*b*) Registered Companies only.
(*c*) Rendered quarterly.
(*d*) Acreage of tappable rubber on 1st May, 1934.

MALAYA RUBBER STATISTICS TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF AUGUST, 1935 IN DRY TONS.

State or Territory 1	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		Jan. to August inclusive 1935		during the month		Jan. to August inclusive 1935						
	Ports	Dealer	Estates of 100 acres and over	during the month	January to August inclusive 1935	during the month	January to August inclusive 1935	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	January to August inclusive 1935
MALAY STATES :—	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Federated Malay States ...	...	10,547	11,510	11,153	90,699	6,069	49,495	Nil	Nil	17	Nil	15,381	4,827	*114,848 †102,808	33,506	...	8,526	10,536	9	74
Johore ...	...	2,307	4,057	4,564	33,175	3,385	27,587	Nil	13	Nil	131	2,879	5,236	20,279	38,618	...	2,259	3,952	...	...
Kedah ...	...	365	2,367	2,752	20,609	1,045	7,749	Nil	Nil	Nil	Nil	1,836	1,961	12,305	15,089	...	339	2,393	...	...
Perlis ...		15	24	10	90	18	128	Nil	Nil	Nil	Nil	Nil	34	Nil	224	...	21	12	...	...
Kelantan ...	...	328	290	360	2,604	588	3,764	Nil	Nil	Nil	Nil	182	701	1,346	4,673	...	410	273	...	...
Trengganu ...	...	55	50	375	2,173	188	1,087	Nil	Nil	Nil	Nil	Nil	563	Nil	3,260	...	55	50	...	...
Brunei	...	5	35	55	392	56	464	...	...	...	...	...	98	...	829	...	16	37	...	...
Total Malay States	...	13,622	18,333	19,269	149,742	11,349	90,274	Nil	13	17	131	20,278	13,420	148,778	96,199	...	11,626	17,253	9	74
S. SETTLEMENTS :-																				
Malacca ...	...	2,724	1,269	1,282	10,330	728	5,254	Nil	13,081	Nil	93,576	2,283	Nil	21,240	Nil	...	2,250	1,263	...	...
Province Wellesley	...	2,407	455	479	3,901	314	1,882	Nil		Nil		9,900		58,676		...	1,418	482	...	...
Penang ...	4,784	9,437	15	17	132	112	771	1,689		17,552						4,453	7,555	13	...	...
Singapore ...	3,908	31,829	255	169	1,492	72	901	9,235		108,597		19,412		181,135		5,912	28,562	203	40	322
Labuan	...	60	Nil	Nil	Nil	18	111	54		716		Nil		Nil		...	33	Nil	...	...
Total Straits Settlements	8,692	46,457	1,994	1,947	15,855	1,244	8,919	10,978	13,081	126,859	93,576	31,595	Nil	261,051	Nil	10,365	39,818	1,961	40	322
TOTAL MALAYA	8,692	60,079	20,327	21,216	165,597	12,593	99,193	10,978	13,094	126,876	93,707	51,873	13,420	409,829	96,199	10,365	51,444	19,214	49	396

*Ocean shipments from Malaya of rubber directly consigned from the F.M.S. † Exports of rubber from the F.M.S.

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	7,529	26,314	7,015	3,482	1,739	199
WET RUBBER	997	2,248	540	235	520	140
TOTAL ...	8,526	28,562	7,555	3,717	2,259	339

TABLE III
FOREIGN EXPORTS

PORTS 29	For month 30	January to Aug. 1935 31
Singapore ...	30,614	270,349
Penang ...	14,891	92,393
Port Swettenham.	5,956	44,214
Malacca ...	412	2,873
MALAYA ...	51,873	409,829

TABLE IV
DOMESTIC EXPORTS 4

AREA 32	For month 33	January to Aug. 1935 34
Malay States ...	33,698	232,726
Straits Settlements	3,286	23,529
MALAYA ...	36,984	256,255

Notes :—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Column (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication, therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 24 September, 1935.

METEOROLOGICAL SUMMARY, MALAYA, AUGUST, 1935.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B.	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						Hrs.	Hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	89.2	71.0	80.1	95	69	84	73	83.5	84.3	10.16	258.1	4.18	18	16	2	1		190.35	6.14	50
Bukit Jeram, Selangor ...	88.8	71.8	80.3	93	70	84	75	83.9	86.0	7.12	180.9	3.11	17	14	1	1		219.70	7.09	58
Sitiawan, Perak ...	88.8	72.5	80.7	93	69	85	74	84.1	85.4	9.10	231.1	1.91	19	16	2			217.50	7.02	57
Temerloh, Pahang ...	89.3	71.1	80.2	93	69	85	73	84.4	85.9	6.74	171.2	1.69	17	12	7	9		206.05	6.65	55
Kuala Lipis, Pahang ...	88.9	70.3	79.6	94	68	85	72	83.2	84.6	13.23	336.1	2.53	22	20	2	27		208.45	6.72	55
Kuala Pahang, Pahang ...	86.4	73.3	79.9	90	70	85	77	86.6	86.9	3.37	85.6	2.13	9	6				261.30	8.43	69
Kallang Aerodrome, S'pore ...	85.6	76.6	81.1	89	73	79	81	82.1	83.5	7.25	184.2	1.18	19	16				209.25	6.75	55
Butterworth, Province Wellesley ...	87.1	73.4	80.3	90	71	84	77	84.2	85.6	10.07	255.8	4.17	21	16				228.20	7.36	60
Bayan Lepas Aerodrome, Penang ...	86.6	73.5	80.1	89	70	83	76	83.9	84.9	12.93	328.4	3.58	21	19	4			224.10	7.23	59
Bukit China, Malacca ...	84.4	72.9	78.6	87	70	80	77	82.6	83.6	13.01	330.5	2.63	17	17	3		1	186.70	6.02	49
Kluang, Johore ...	87.3	70.3	78.8	92	68	81	75	80.4	81.9	7.87	199.9	1.81	17	15	6	15		162.45	5.24	43
Bukit Lalang, Mersing, Johore	85.5	71.0	78.3	90	69	82	75	80.9	81.6	8.91	226.3	1.76	15	14	4			208.10	6.71	55
Alor Star, Kedah ...	86.9	73.5	80.2	93	71	83	77	85.8	86.3	15.45	392.4	3.25	22	17	5	2		214.85	6.93	56
Kota Bahru, Kelantan ...	89.4	72.6	81.0	92	70	87	75	84.9	85.5	5.34	135.7	1.19	12	11	1			256.25	8.27	67
Kuala Trengganu, Trengganu	89.2	72.1	80.7	91	70	86	75	83.8	85.0	2.60	66.1	0.72	11	9	2			263.50	8.50	69
HILL STATION.																				
Fraser's Hill, Pahang 4268 ft.	74.1	61.6	67.9	78	60	70	64	71.1	71.7	8.27	210.1	1.10	22	18	2	20		183.80	5.93	49
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	72.5	55.5	64.0	78	48	68	59	69.5	69.7	12.01	305.1	1.60	21	19	2			124.00	4.00	33
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	70.9	58.5	64.7	78	56	65	61			12.59	319.8	1.69	22	19	2			134.60	4.34	35

Compiled from Returns supplied by the Meteorological Branch, Malaya